

Lithuanian University of Health Sciences

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The cross cultural differences in the perspective of
the students at LUHS on schizophrenia.

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Submitted in partial fulfilment of the requirements for the
degree of Master of Medicine, M.D.

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SUMMARY

Author: Abrar Ahmed

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Research title: The cross cultural differences in the perspective of the students at Lithuanian University of Health Sciences (LUHS) on schizophrenia.

Aim: To investigate the diverse cross cultural perspective on schizophrenia amongst the students of Lithuanian University of Health Sciences (LUHS).

Objectives of the study: 1. to investigate if there is a correlation between a cultures which openly discuss the disorder schizophrenia and the outcome of this for the patient.

2. To investigate factors in different cultures which may hinder the general management of schizophrenia

3. To investigate attitude amongst different cultures towards mental health.

Methodology: This was a cross sectional study with a controlled group of LUHS students. A questionnaire was handed out to the students with specific choices to narrow the spectrum in the variety of answers.

Results: 25.5% were European/American, 35.8% were Middle Eastern, 22.6% were South Asian/Asian and 16% were African. 50% said they grew up in the 'western' world, 5.7% were of mixed race, 25.5% grew up in the 'non-western' world and 18.9% grew up as TCK's

Conclusion: There is a correlation between the way in which a culture perceives mental illness especially schizophrenia. As the treatment regime of schizophrenics is a combination of psychotherapy and drugs, the culture which the patients is imbedded into will have a significant impact on outcome and compliance to medication.

Recommendations: A greater sample size to be used to thoroughly asses the statically significance

ACKNOWLEDGEMENTS

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CONFLICT OF INTEREST

The author reports no conflicts of interest

BIOETHICS CLEARANCE

The cross cultural differences in the perspective of the students at Lithuanian University of Health Sciences on schizophrenia

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ABBREVIATIONS

TCK-Third Culture Kid

Vs- Versus

LUHS-Lithuanian University of Health Sciences

INTRODUCTION

The definition of a third culture kid is one who was raised outside the culture of their parents. The resulting culture which the person develops is a mixture of both their parent's culture and the culture in which they were raised in, hence them making it their 'Third Culture' In many cases through their adolescent years they will feel at a loss in identifying wholly with one specific culture or have a sense of a country or place in which they can call home. Sociologist Ruth Hill Useem was at the forefront in further exploring the social and psychological impact of being a Third Culture Kid.

It is a truth universally acknowledged that the socio demographics of the world, specifically the 'Western World' is rapidly changing, and with this change comes the blossoming and integration of cultures and societies. At the forefront of these developments are the TCK's who have the advantage in bridging gaps between cultures that in many cases do not understand the traditions and customs of one another. But this responsibility is not just left for the TCK's, it is the responsibility of every person who was put in a unique position of understanding more than one culture in which they were born into e.g. those of mixed-heritage. This responsibility comes into play greatly when it comes to the topic of mental health. All across the border in cultures the topic of mental health is one which is never truly spoken about and as a result diseases such as schizophrenia are never fully understood.

Schizophrenia is a psychotic disorder which is categorized by either 'positive' or 'negative' symptoms. Positive symptoms include hallucinations and delusions. Negative symptoms cause lack of motivation and becoming withdrawn. As there has never been an exact reason given for why schizophrenia occurs it becomes very difficult to answer questions of why in people with family histories of schizophrenia it skips a generation and sometimes vice versa. As the world is ever changing it becomes important to understand what the different cultures have to offer. Because of the differences of the cultures, it becomes clear that in psychotic disorders such as schizophrenia where patients can experience hallucinations, these hallucinations differ greatly even with different societies

In her paper Judy M. was also able to prove that in different aspects of cultures, even names of common psychiatric disorders differed greatly and were usually related to words from the disease or according to folklore. She understood that due to the diversity of the world, for the full treatment of schizophrenia it is imperative to incorporate not only drugs into the treatment regimen. This is due to schizophrenics are having a better chance of medication compliance if the society around them is supportive. Different cultures have varying views of mental health, some cultures will openly embrace discussions, while to others it is a disease which does not exist.

AIM

To investigate the diverse cross cultural perspective on schizophrenia amongst the students of Lithuanian University of Health Sciences (LUHS).

OBJECTIVES OF THE STUDY

1. To investigate if there is a correlation between a cultures which openly discuss the disorder schizophrenia and the outcome of this for the patient.
2. To investigate factors in different cultures which may hinder the general management of schizophrenia
3. To investigate attitude amongst different cultures towards mental health.

The object of research: International students of LUHS.

Sampling and data collection method: Among 200 randomly selected students of LUHS from all years of study and faculty (proportionately). After signed informed consent form students will answer a questionnaire which will assess their cultures view on schizophrenia.

LITERARY REVIEW

It has long been theorized that the development of schizophrenia is mainly due to a combination of genetics and the environment in which a person is exposed to. Mental illness like schizophrenia need to be treated on a case by case bases and not every person will have the same outcome when it comes to the methods of treatment. This treatment like all other mental illness is a combination of psychotherapy and psychopharmacology.

In the world of general medicine, if a patient has an episode of syncope there is a well-known management plan to stabilize the patient in conjunction with definitive tests to understand the causative disorder. Those patients when diagnosed with a well understood and “more common” disease will have continuous check-ups throughout their life to monitor for any other comorbidities. For patients who are diagnosed with schizophrenia, although they have a specific criteria which can lead to a diagnosis, the other aspects of their health will often be neglected. The audit which was performed by Mike J. Crawford, shows clearly that schizophrenic patient’s general physical health falls well below the standard at which it should be. The main issue with this is that in many parts of the world, mental health issues are viewed as a completely separate entity from other general medical illnesses, which leads to reduction in the quality of care. In South Africa, Inge Petersen and her group of researchers tried to implement a mental health package which would coincide with the primary health care system. They hoped that this package would be in place to help those patients who suffered with chronic illness such as depression, alcoholic disorders and schizophrenia. Their vision faced many challenges including lack of motivation of the patients to attend clinics which they set up for continued follow up medication as well as group rehabilitation. They had aimed for these sessions to be a multidisciplinary team effort with both the schizophrenic patients attending as well as the caregivers, however out of the six patients only one caregiver attended. These comorbidities can sometimes be a greater risk to the patient’s life than the actual diagnosis of schizophrenia. This is especially true when it comes to the discussion of suicide prevention in schizophrenia. As indicated by the study conducted by D. Healy and his team, there has been a clear increase in suicide rates among schizophrenic patients. It was noted that this can be contributed to two reasons; the deinstitutionalisation of patients and the change in regimen in their medications. The recommendations was that more attention should be emphasized on the psychopharmacology as this is the main criteria which can be controlled in a clinic setting. Recommendations like these are how progression in the prevention of suicide in schizophrenic patients occur. This was the main objective from the study conducted by Isabella Hunt. Interesting two very similar researchers were conducted, the first was to understand why there was correlation between a high suicide rates in patients who are of ethnic minority. She believed that there needed to be a more in depth look by mental health care specialists to address the social aspects of patients with severe mental illness, as in comparison to their white counterparts ethnic minority individuals were more likely to have had a prodromal period (with many of these patients having schizophrenia) before they committed suicide. The study surveyed

individuals in both Wales and England, in which they found that seventy percent of patients who committed suicide per year were of ethnic minority. An argument can be made against this assumption, in that when looking at the demographics in a country where the predominant race is white trends will emerge higher in the ethnic minority. However by taking a look at studies which have been conducted in rural areas of China, it can be noted that the same pattern emerges. From this it can be concluded that schizophrenic patients who are at a disadvantage when it comes to their social standing as well as feelings of neglect are at a greater risk of committing suicide. The second study was done in which they looked at the difference in age and the methods of suicide. They found that younger patients who had schizophrenia were more likely to commit suicide by more violent means. Again, the researchers came to the conclusion that when it came to dealing with patients who had schizophrenia a multidisciplinary team effort was required as a trend of non-compliance with medication, drug abuse were a recurring trend.

There have been many theories put forward about the best ways in which the treatment of schizophrenic patients could provide the best results, the environment is a major factor which plays a role. The income, society, culture, religious background, country and family history are all things which must be considered when discussing the effects the environment has on both the predisposition and the treatment outcome of patients.

A study by Lawrence H. Yang showed that the employment prospects differed greatly when it came to whether schizophrenics lived in an urban setting or in a rural area, those who lived in a rural area had a greater chance of finding employment than their counterparts. And while biologically there have been researches conducted by the likes of Martin Tesli, to examine if specific genes such as the Vaccinia-related kinase 2 (VRK2) gene play a role in development of schizophrenia, no concrete conclusion has been made. There has been proof that there is a link between those who have schizophrenia and ADHD which is mainly due to the genetic makeup of a person.

It can also be debated that in some parts of the world, there is a greater risk of developing schizophrenia mainly due to the ethnicity of the person. In recent years there has been a steady increase in migration and with this a pattern has emerged that those patients who are of mainly second generation have a higher prevalence for developing schizophrenia. The greatest incident rate was within the African-Caribbean community. J. B. Kirkbride noted that even when adjustment were made according to the age and gender, black and ethnic minority (BME) were still at a higher risk of developing schizophrenia in comparison to their White counterparts. Whereas the Black African and Black Caribbean were at the highest for schizophrenia, 80% of them were of second generation and beyond. Paul Fearon and Craig Morgan demonstrated that there is clear data which supports the idea that those from an ethnic minority who are either 1st generation or second generation have a greater chance of having schizophrenia. They also noted that similar results of the past, there was a greater incidence rate among African Caribbean which was higher than those of the other ethnic minority. There are some arguments that the specific people who migrated were already predisposed to mental illness and therefore raised the data for the rate of schizophrenia, however Paul Fearon and Craig Morgan noted that when studies were conducted in the country of origin, there were similar results to those that were found amongst Whites in the UK, thus the main issue is within the ethnic minority in the UK. The multiple studies which

have been conducted by Tarik Qassem and others like him in the team has unequivocally proven that there needs to be a thoroughly investigation into the correlation so as to further understand schizophrenia. This is of special importance to in understanding the rich diversity, where recent studies have suggested that even the hallucination that occur during psychosis are significantly different in the different cultures.

The environment which predisposes people to schizophrenia can be wide and varied across countries and cultures. There are two main issues which increases the risk of developing a mental illness further on in life. Firstly the study by Ian Kelleher proved that adolescents who had experienced psychosis, were more likely to have had a past traumatic life event which put them at a greater risk for developing a psychotic illness in their adult life. Secondly studies have shown that children of schizophrenic parents are at a higher risk of developing schizophrenia later, this is mainly due to the fact that these children are surrounded by specific stressor which predisposes them. These specific stressor can be understood when it comes to being in the environment with a family member who has schizophrenia, but is there similar risk for those children who live with relatives who have other mental illness? In a study where children were born to mothers who had a diagnosis of either; schizophrenia, bipolar disorder, unipolar depression they found that in comparison to children who were not born to mothers with a mental illness there was a greater chance of the children developing an intellectual disability. They also noted that in comparison to all three mental illness the highest risk factor was in fact for schizophrenia (3.2%) in comparison to 3.1% and 2.1% for bipolar and unipolar depression respectively. This was also the main conclusion which came about from the analysis of Alexis E. Cullen who took children of three categories; those who had a family history of schizophrenia, those who were showing early signs of schizophrenia, and those who were of low risk. They concluded that the children who fit into the category of both early signs of schizophrenia and family history were at a greater risk for schizophrenia as well as having effected by daily stressors.

The idea that a person will be stigmatized for their mental illness which they have is a long held and understood belief within the psychiatric community. From these discussion a scale which assess the stigma felt by schizophrenic patients (The internalized Stigma of Mental Illness scale) was made. It is a tool with many different subcategories to determine the stigma patients with different mental illnesses perceive. As there was no formal version of this which could be used for Japan, the researchers Yosuke Tanabe, Kunihiko Hayashi and Yuki Ideno conducted research to see how reliable it could be if applied to the Japanese demographic. As has been the general trend with mental illness, they noted that mental illness in Japan was a topic which was treated as a disease that although existed, was not to be seen or faced, patients who were diagnosed were mostly institutionalized into hospitals and sheltered from the world under the pretence of other illnesses. They produced a table which showed the different domains of stigma which were evaluated and looked at how this compared to other countries. It showed that the internal stigma which was felt by Japanese patients who had schizophrenia was also closely related to those in China. They noted that this might be due to both countries being in East Asia. Other countries which were compared included South Africa, Austria, Ethiopia and the US.

In comparison to other medical disease, schizophrenia is not often an easily recognizable illness, even within the medical community misdiagnosis of mental illness is common. This

was one of the main focuses of a study carried out by .Madrid was the focal point of the study where a record of all the patients that were diagnosed has been kept according to the ICD9 which were then converted into ICD 10 codes. This allowed them to follow patients in three different settings; in the out patient settings, in the in-patient setting and in the emergency setting .The different psychiatric disorders which were tracked were schizophrenia, mood affective disorders, Obsessive Compulsive Disorder, eating disorders and personality disorders. A follow up was maintained for each patient as they went through each of the different settings, to try and determine if the patient was continuously diagnosed with the same disorder from their very first presentation to the various settings all the way to the very last concluding diagnosis. One of the questions which they wanted to identify was how accurate the final diagnosis of the patient as this was a direct correlation of the effectiveness of the ICD criteria for each of the diagnoses. The measure of the stability was defined interestingly by three different methods; the prospective consistency being the most relevant to schizophrenia, it showed that in the outpatient setting this figure was 68% while in the emergency setting it was 80.5% which was also compared to the inpatient setting which came to 92%. This can be both a positive and a negative conclusion. The diagnosis of schizophrenia when made in an emergency setting is so overwhelming that no further investigations are conducted to differentiate it from another disease, and patients can sometimes be misdiagnosed. The researchers concluded by noting that the most stability for a reliable diagnosis from the onset of first being presented was the inpatient setting.

Schizophrenia is a complex and multifactorial disease of the brain and as a result has numerous ways in which it can be managed. However in many parts of the world the idea of mental illness let alone seeking help from a psychiatrist is not an accepted or even taboo topic. Due to these it was imperative to understand if this was the driving factor which caused patients not to seek help when symptoms manifested and the lack in complying with treatment.

This was the main theme to be explored in the study conducted by Santosh Loganathan and Srinivasa Murthy, which explored the socio-cultural issues among the different genders faced by patients who were diagnosed with schizophrenia in India and the resulting social isolation and stigma. They recognized that the fear and social situations which occurred were diversely different when it came to men and women. Among men the most prevailing dysfunction was in the work place, whereas for women it was in relation to marriage.

The study identified the different issues faced among men and women when it came to daily living with schizophrenia. As cultural acceptance is of great importance within the Indian community, the difficulties most voiced were ones which related to roles of men and women which were considered to be the “norm”, and what occurred when these roles were unable to be fulfilled. These roles included that for a man to attain a job and be capable of providing for the family. This was in contrast to that of women whose main role was that of home maker. The diagnosis of schizophrenia for many of these patients threw the plans in disarray. It was evident that the outcome in the standard of life for many of these patients was difficult as they understood that revealing their diagnosis to their surrounding community will result in them being ostracized from the community regardless of the stature they had reached, in one case it was noted that the woman who had revealed she had schizophrenia to her boss,

although had attained a high status in her work life was still advised to not further discuss her illness. In the case of women they were not able to get married.

For those who had married without revealing their diagnosis to their partners, when their illness was exposed they were divorced or the children were taken away from them as it was believed they were unfit to raise them. They concluded by noting that the best outcome for patients was the education of the Indian community about schizophrenia as this will result in an open discussion and understanding of the illness.

Out of fear of stigmatization many patients hide their diagnosis from their surrounding families and in many cases would substitute the real diagnosis for another more acceptable medical condition. All this is in fear of being out casted from their society. This fear of being a social defeat is also prevalent in the study conducted by Danni Li. The patients who were of first/ second generation had a more feeling of social defeat which increased their likelihood of developing schizophrenia as they felt they neither belonged to a specific culture.

RESEARCH METHODS AND METHODOLOGY

This was a cross sectional study with a controlled group of LUHS students. A questionnaire was handed out to the students with specific choices to narrow the spectrum in the variety of answers. Before the surveys was distributed there was consent granted from the bioethics committee of LUHS. 106 LUHS responded to the survey. The survey was divided into different sections to evaluate the culture background, ethnicity and opinions to mental health with specification to schizophrenia. I created my own questionnaire so as to allow me to get a better variety of the students within LUHS students. This consisted of different sections.

Section 1: Sociodemographic

Section 2: This was to gauge the attitudes of the participants towards mental illness and their understanding of mental illness (specifically schizophrenia)

Section 3: This was to understand if their culture was open to discussing mental health issues.

Section 4: This section was questions to conclude the students concept of what schizophrenia is, how the culture defined and if this affected their views

Section 5: As the survey was based on the medical students of LUHS, this section was made to explain how the students could think of schizophrenia from a point of view of a medical background

Section 6; this section was to identify the way in which the culture views schizophrenia should be treated.

The analysis of the data was implemented using data collection and analysis SPSS 20.0 (Statistical Package for Social Science for Windows) package. The difference between groups was considered as statistically significant when $p < 0.05$.

RESULTS

Overall 106 LUHS students completed the survey. Below are the results, divided into tables for convenience

Table 1. Ethnicity vs Upbringing

			Ethnicity			
			European/American	Middle Eastern	South Asian/Asian	African
4. how would describe yourself and your upbringing	1	Count	3 _a	2 _a	1 _a	0 _a
		% within Mixed	11.1%	5.3%	4.2%	0.0%
	2	Count	4 _a	12 _a	8 _a	3 _a
		% within Non-Western	14.8%	31.6%	33.3%	17.6%
	3	Count	18 _a	17 _a	11 _a	7 _a
		% within Western World	66.7%	44.7%	45.8%	41.2%
	4	Count	2 _a	7 _{a, b}	4 _{a, b}	7 _b
		% within TCK	7.4%	18.4%	16.7%	41.2%

Table 2. Ethnicity of participants

	Frequency	Percent	Valid Percent
European/American	27	25.5	25.5
Middle Eastern	38	35.8	35.8
South Asian/Asian	24	22.6	22.6
African	17	16.0	16.0
Total	106	100.0	100.0

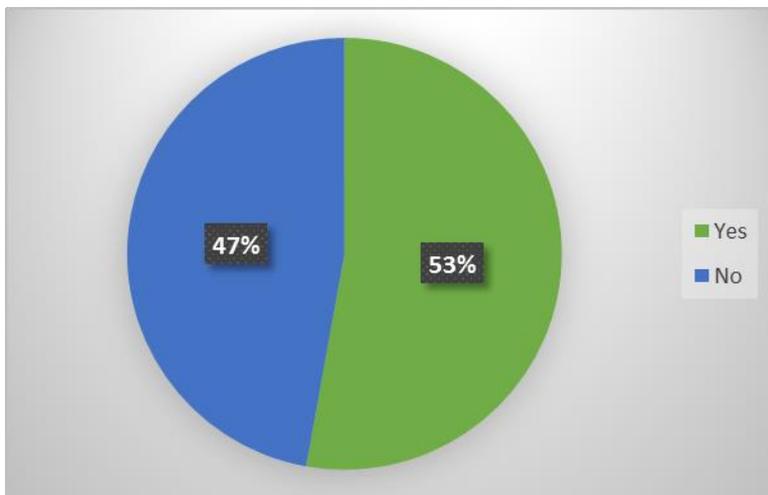


Table 3. Do you think your culture

affects the way you view mental illness?

Table 4. Is your culture open to discussion of schizophrenia? (p value: 0.091)

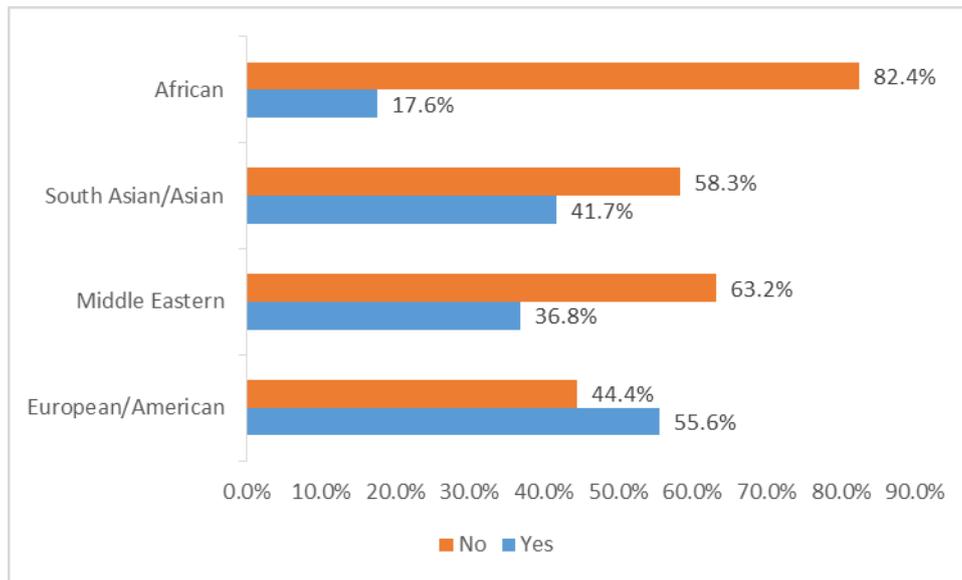


Table 5. Ethnicities of people where seeking help for Schizophrenia is acceptable.

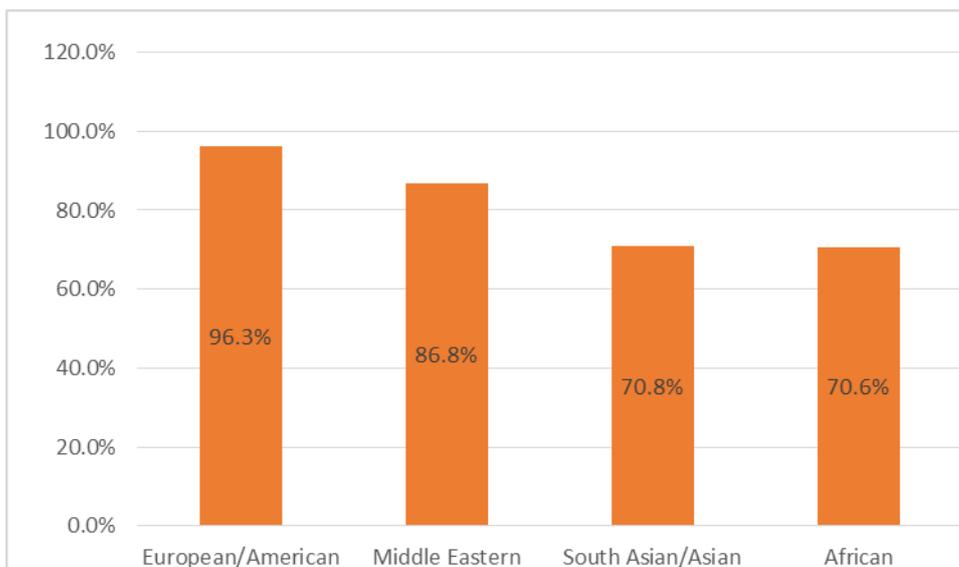


Table 6. Individuals insight on the various ways of treating schizophrenia (p value = 0.109)

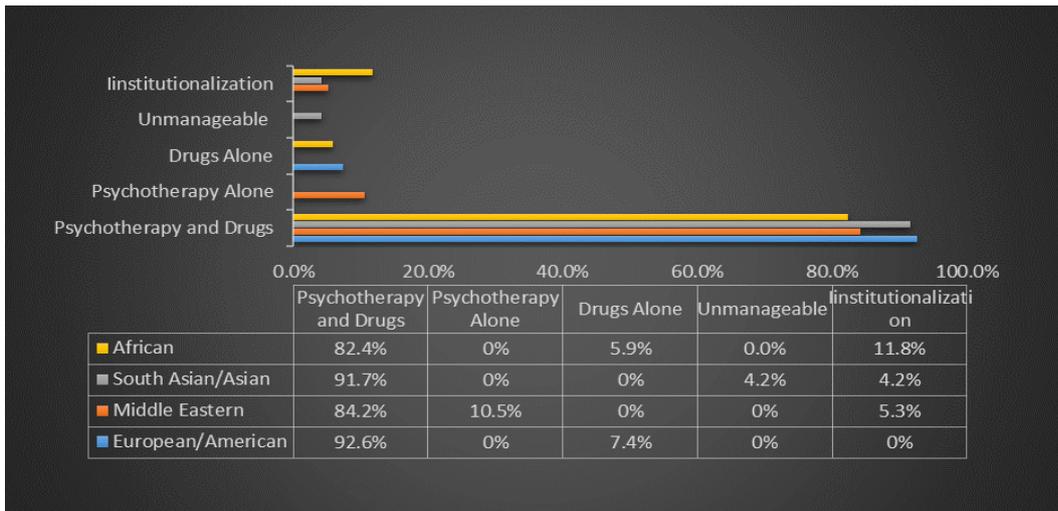


Table 7. Views of culture on treatment of schizophrenia.

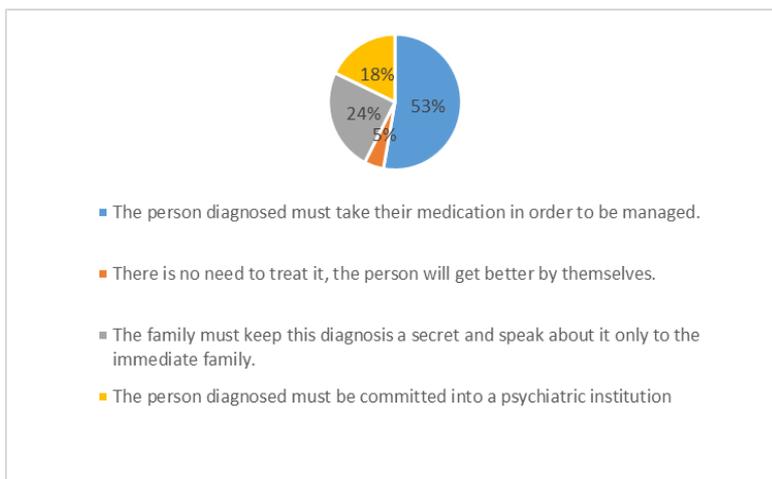


Table 7.1(p value= 0.701) Cultures beliefs on how schizophrenia should be treated.

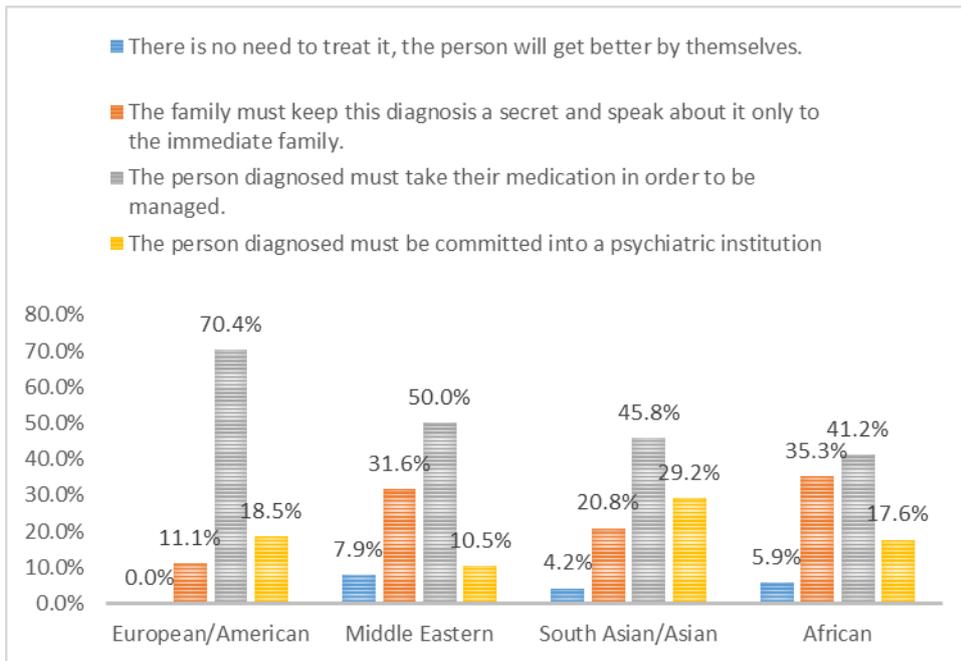


Table 8. Ethnicities vs. Cause of Schizophrenia

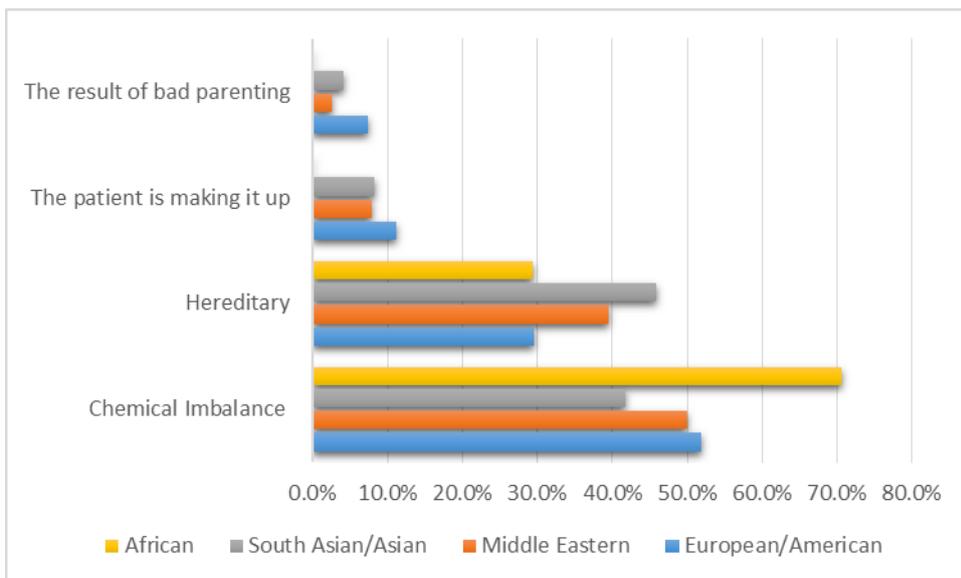


Table 9. The Upbringing Background of participants

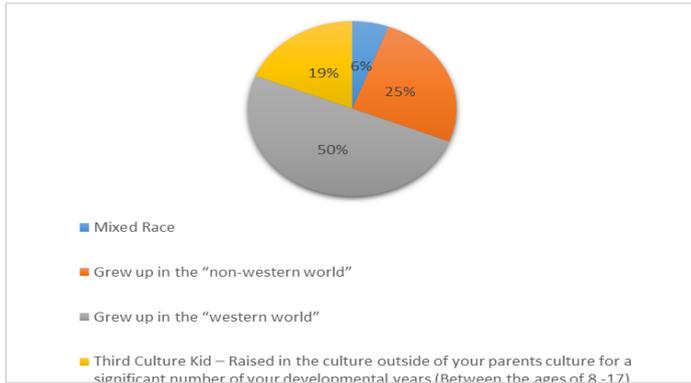
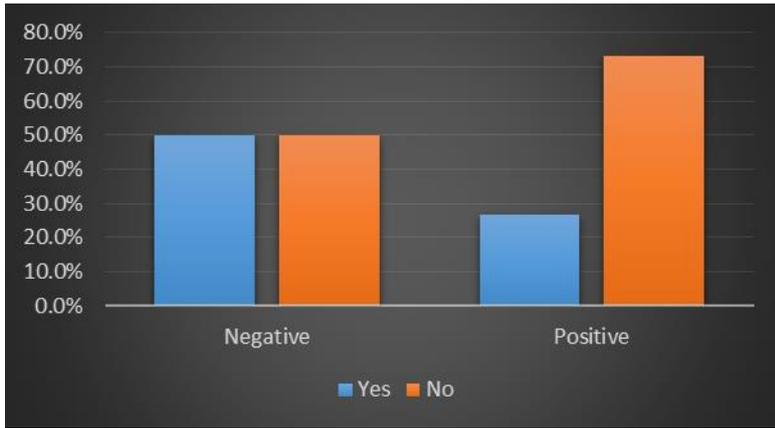


Table 10.

P value: 0.452			Do you think your culture affects the way you view any mental illness?	
			Yes	No
In what way do you think schizophrenia can be managed?	1	Count	51 _a	42 _a
		% within psychotherapy and drugs	91.1%	84.0%
	2	Count	2 _a	2 _a
		% within psychotherapy	3.6%	4.0%
	3	Count	2 _a	1 _a
		% within drugs alone	3.6%	2.0%
	4	Count	0 _a	1 _a
		% within unmanageable	0.0%	2.0%
	5	Count	1 _a	4 _a
		% within institutionalization	1.8%	8.0%

Table 11. Negative/Positive attitude vs. Discussion outside of family. (p value =0 .212)



DISCUSSION

Of the 106 students that were surveyed the results showed that the demographics were distributed as such (From table 2); 25.5% were European/American, 35.8% were Middle Eastern, 22.6% were South Asian/Asian and 16% were African. This was the first set of demographics to be evaluated, the next part was the background of the students to identify the upbringing and to understand if in some cases the students were children of second or first generation immigrants(TCK). Although this section was answered, there seemed to be disparities within the results as some of the students did not fully understand the meaning of a Third Culture Kid. This can be seen in Table 1. As such these values were no longer able to be used to for assessment in the next sections.

My first aim was to understand if there was a correlation between those who said that schizophrenia was discussed openly within their culture and if this effected the outcome for the patient. As has been discussed from previous studies, the environment of patients with schizophrenia is vital to the outcome in their treatment. If patients live within a society and culture which shies away from discussing mental illness, schizophrenics will inherit the idea that their illness is shameful. Table 4 shows the different ethnicities and in accordance with their culture if schizophrenia is discussed openly in their culture. The results from this table gave a p value of 0.091, this means that the statistical difference was insignificant. However, when evaluating the individual values there is a clear evidence that those who were African 82.2% agreed that their culture does not openly discuss schizophrenia. This is in contrast with 55.5% of European/American who agree that schizophrenia is discussed openly within their culture. From this I concluded that Africa was more of a closed culture to the ideas of mental health as well as schizophrenia whereas the European/Americans have a more open dialogue. This further allowed me to evaluate the specific answers when it came to each of the two cultures as they could now be put on opposite ends of the spectrum. This allowed me to further compare these two cultures in terms of what their views were to treatment and causes of schizophrenia. While analysing the data I found that in many cases the p value was not statistically significant, for this reason I have chosen to evaluate the results on an individual bases, which would give a broader and truer picture of the true results.

Compareing table 6 with table 7.1

Table 4 shows the way in which the individuals thought the way schizophrenia should be treated. It can be noted that the highest method which individuals thought schizophrenia should be treated was through psychotherapy and drugs. These figures were above 80% across the board. However when looking at the results in table 7.1 about the way the culture believes schizophrenia should be treated although the method of taking medication is still the highest result, there does not seem to be a bigger gap which is noted between the other options as is seen in the European/American group (70.4% vs 18.5%). The differences are noticeable when looking at other cultures. 35.3% of Africans agreed that their culture would not speak about the diagnosis of schizophrenia and would only allow family members to know of the illness,

which seemed to echo the results of the Middle East (31.6%). The highest vote for instulizing the patients was from those of Asian/South Asian culture.

Comparing table 6 and table 3

Because the results of table 4 were unimaously high I wanted to understand if this individual thought process would be affected by the persons culture. I asked the participantats to evaluate themselves, to asses if they themselves thought the culture in which they grew up in played a role in the way they viewed menatl illness. The results were surprising, it showed that 52.8% of people agreed that their culture does affect the way in which they view metal illness. This was surprising and begs the question, from table 3 with the exception of the European/Americans all other cultures said that their culture is not open to the idea that schziophrenia could be discussed, and more than half of the people surveyd are affected by their culture, is the influence of culture greater than people are aware? This was even more surprising when you note that all the students who were surveyed had a medical backgroud so although they understand the ways in which It should be treated their culture still played a major influence. It is also worth mentioning that from past studies of Tariq Qaseem and his fellow colleaques it has been shown that the highest ethncties who are prevelent to schizophrenia are those of African decents, and from looking at the results individually it seems that this is the culture which is mostly not open to discussingg of mental helalth and diseases such as schizophrenia.

I found that the different aspects that hinder the mangment of schizophrenia was mainly due to the openness of the culture to talk about major mental illness. The participants were asked if they had any family members who had suffered from any mental illness's, and if this diagnosis was discused with people outside of the family, these resultes were then charted against what their cultures opinion was on seeking help from a psychitrist. Table 11 shows these reults. The reulsts here were slightly contraticting, it shows that although people's culture had a postive attitude towards seeking help from a psychitrist, when it came to disclosing the information about the nature of their diagnosis, it was still thought of as something which must not be discussed. From this it can be thorized that although these cultures that are open to discussions about mental health, this is merely due to beigng compared to cultures who have no intentin of opening up.

CONCLUSION

From the above results it can be concluded that although there was no statistical significance, the reason for this statistical indifference can be due to two reasons;

1. The sample size for the questionnaire was too small to give an adequate reading, this may have given a smaller number in each category when it came to dividing the participants into ethnicities as well as background upbringing.
2. There was an error due to the misunderstanding of the students to some questions.

However from the specific tables, there is clear evidence that the cultures such as the European/ American were more open to discussing both about mental health and schizophrenia, this was the true reflection when it came to the treatment of schizophrenic patients. In many occasions the recommendation for the treatment and the cause fell in line with what is generally understood about schizophrenia. This was in contrast to other cultures. Whereas in the Europeans/Americans there would be no percentage of the sample who agreed with statements such as “the patient does not need to be treated, they will get better on their own” On many different occasions these options showed a small number of the participants agreed with this. Although this percentage was small, it is mainly ideas and thoughts which are deconstructive and cause schizophrenic patients to be stigmatized against which causes delays in the treatment

PRACTICAL RECOMMENDATIONS

A greater number of participants is needed to increase the sample size and improve the statistical significance

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